Monetary Policy of the Bank of Korea during the First 60 Years

Kyungsoo Kim and Jaewoo Lee *

The current paper provides an analytic overview of the history of monetary policy in Korea, since the founding of the Bank of Korea in June 1950 through the spring of 2010. In light of the dramatic socio-economic transformation over this period, the 60 years are divided into four phases, which provided a different environment for the conduct of monetary policy. An organizing analytical framework is proposed for each phase, with the hope of facilitating further research.

Keywords: Inflation, Liberalization, Small open economy

JEL Classification: E4, E5, F4

I. Introduction

The Bank of Korea (hereinafter denoted as "BOK" or "the Bank") was established as the central bank of the young Republic of Korea in June 1950. In the same month, the Korean War broke out, which devastated the country socially and economically for the next three years. After much

* Professor, Department of Economics, Sungkyunkwan University, 53 Myeongnyun-dong 3-ga, Jongno-gu, Seoul 110-745, Korea, (Tel) +82-2-760-0431, (Fax) +82-2-760-0946, (E-mail) kimks@skku.edu; Corresponding Author, Deputy Division Chief of the Open Macroeconomics Division, the IMF Research Department, 700 19th St N.W., Washington DC 20431, USA, (Tel) +1-202-623-7331, (Fax) +1-202-589-7331, (E-mail) jaewoo.lee@alum.mit.edu, respectively. We appreciate the comments by participants in the Bank of Korea 2010 Conference, the seminar in the Korea University, and the 18th Seoul Journal of Economics International Symposium in Seoul National University, and in particular, by Andrew Filardo, Stan Fischer, Dongsoo Kang, Jun Il Kim, Soyoung Kim, Kwanho Shin, and Woon Shin. This paper is based on personal views of both authors as macroeconomists, and does not necessarily reflect the views or policies of the Bank of Korea or the IMF. The views expressed herein should not be attributed to the IMF, its Executive Board, or its management.
[**Seoul Journal of Economics** 2011, Vol. 24, No. 4]

subsequent political turmoil in the ashes of war, the Korean economy began to stage a remarkable growth that continued for four decades, landing Korea in the group of advanced economies in many international classifications by the 2000s (*e.g.*, World Economic Outlook or World Development Indicators).

Considering the weight of the socio-economic drama in these 60 years, it is plainly an audacious, if not quixotic, attempt to canvass the monetary policy of the BOK in some 20 pages. We thus make no claim to being able to do full justice to its dynamic history, but instead attempt what might be called a helicopter tour, borrowing from the familiar rhetoric for central bank's monetary policy. Without attempting to provide a full documentary, we seek to offer organizing themes of various phases of the first 60 years in light of simple macroeconomic frameworks.

There are several reasons for our approach. The full details of history —which cannot be covered in a paper like this— have been documented in several excellent books.[1] We hope to contribute a complementary analysis of these impressive 60 years by identifying conceptual frameworks that capture key macroeconomic characteristics of several different phases through which the Korean economy and macroeconomic policy have morphed during the past six decades. In so doing, we hope to invite further macroeconomic analysis of Korea's policy and development experience, which may also provide lessons for countries in the early stage of their own development trajectory. At the same time, we hope to distill lessons for the current and future challenges for the monetary policy of the BOK, as it enters its next 60 years.

Our overall view of Korean monetary policy is positive. During the first three decades, monetary policy was constrained by historical and economic circumstances of the time. Except for the very early years includeing war time, however, monetary policy avoided the worst form of fiscal dominance. Despite long periods of high inflation and financial repression, the Korean economy stayed clear of a severe wage-price spiral, or more generally, the bind of what the late Dornbusch (1996) called the "Latin Triangle." A decade-long liberalization met with a crash in the late 1990s, but the subsequent recovery was fast and strong. Additionally, over the most recent decade of inflation targeting, monetary policy provided a steady anchor befitting an industrialized economy that is inte-

[1] For a detailed account of Korea's financial development (including the role of the central bank), see Cole and Park (1983), Woo (1991), and Hoshi, Kim, and Park (2010).

grated with the global economy in real and financial terms.

This positive view is not to look away from formidable challenges that remain. As was made clear during the global crisis over the last two years, Korea remains vulnerable to the vagary of international capital flows, which poses a tough challenge for economic policy at large and monetary policy in particular.

The rest of this paper is organized as follows. In the section that immediately follows, we offer a brief overview of history and introduce our definition of four different economic phases. Subsequent sections discuss these four phases in greater detail, followed by the penultimate section that discusses the last two years, which warrant a special discussion. A short conclusion wraps up the paper.

II. Overview of History

We divide the past 60 years into four periods that had different economic environments for the conduct of monetary policy. Each period had a defining macroeconomic characteristic, which reflects the historical and economic situation of the time. We name the four periods according to those characteristics as follows.

War and Its Aftermath, 1950-1962/1965
Big Push, 1962/1965-1983/1985
Liberalization, 1983/1985-1998
Open Macro-economy, since 1999

Our motivation for this division is illustrated in Figure 1. Its four panels show: (1) inflation and fiscal deficit; (2) growth and inflation; (3) money multipliers; and (4) exchange rates (nominal and real values against the U.S. dollar). These are all annual data, obtained from the BOK publications (BOK 2005) for the early years. To describe the data in some detail, they are the CPI inflation rate, fiscal deficit in percent of GDP, growth rate of real GDP, money multipliers as ratios of M1 and M2 over the base money, and nominal and real exchange rates of the Korean Won relative to the U.S. dollar.

The defining characteristic of the first period is the monetization of the large fiscal deficit. During the war years (1950-1953) and their aftermath, fiscal deficits remained high, and the central bank seigniorage could not help being a source of government finance for much of this period. As

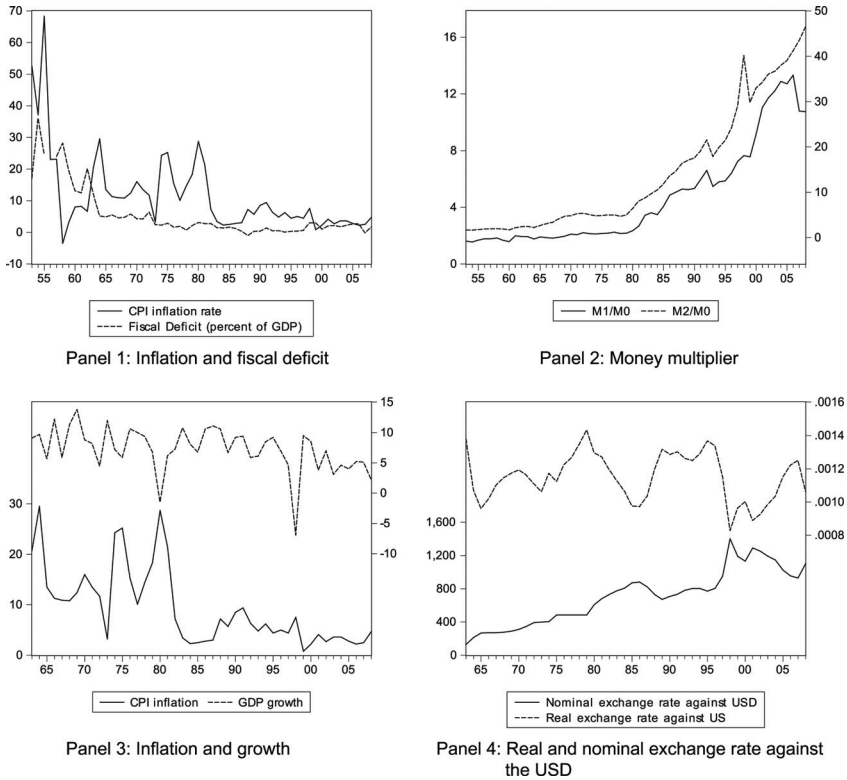


FIGURE 1
OVERVIEW

monetary policy was constrained by fiscal needs, the inflation rate was very high, reaching high double digits in several years.

The second period marked the start of the four decades of high economic growth, but the inflation rate remained moderately high, staying in double digits in many years. We name this to be the period of Big Push (Gerschenkron 1962), as the economic growth took off under the nationwide economic mobilization program. Within the mobilization program, the central bank was called on to play an important role in development financing, again constraining the conduct of monetary policy. As a result, inflation rate remained high, and several sizable devaluations occurred.

The third period was characterized by the liberalization of the financial system, and was accompanied by inflation rates lower than in earlier decades. The low inflation reflected both the receding constraint on monetary policy and the global low inflation environment since the early

1980s following the Volcker disinflation. The macroeconomic consequence of financial liberalization showed up clearly in money multipliers. The ratios of M1 and M2 to the base money began to rise in this period, following two decades of little change. The pace of liberalization was gradual for most of the period, but turned into a shock liberalization following the Asian crisis in 1997.

The fourth period had all the trappings of an open macro-economy integrated into the global financial system, coming after the shock liberalization during the Asian crisis (Fischer 2003). One visible consequence was the increase in the exchange rate flexibility. Inflation targeting was adopted as the mode of monetary policy and the call rate was adopted as the instrument, giving closure to nearly five decades of targeting money supply. Monetary policy was conducted under the inflation-targeting regime, and the inflation rate remained stable. The tail end of this period was punctuated by the global financial crisis and the Great Recession since the late 2008.

We will go over each period in the sections that follow, and devote a separate section to the 2008-2009 period of the Great Recession, which posed a significant challenge to the macroeconomic and monetary policy of Korea.

III. War and Its Aftermath

A. Chronology (1950-1964)

The Bank of Korea was established as the central bank of Korea in June 1950.[2] Its Monetary Board was given the legal authority to decide on monetary policy operations.

Its early years were saddled with turmoil. The Bank started with burdens inherited from the five-year confusion following the withdrawal of the Japanese colonial government in 1945. On top of it all, the Korean War broke out in June 1950, in the same month as the founding of the Bank. The war ravaged the country for three years, claiming large human and material costs. The fiscal burden of war and subsequent political turmoil severely limited room for monetary policy.

There was a short-lived attempt at bank privatization that lasted six years. In the 1956 bank privatization, the majority stakes that the govern-

[2] The BOK was transformed from the Bank of Chosun of the colonial period, which in turn had originated from the Bank of Korea established under the last monarchy.

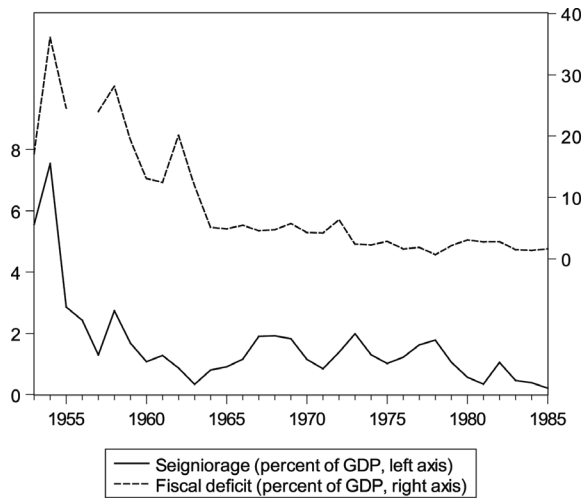


FIGURE 2
DEFICIT AND SEIGNIORAGE

ment had held in commercial banks were sold to the private sector. However, the solution resulted in a large concentration of ownership among a few investors. These banks, however, were re-nationalized in 1962 amid sweeping financial sector reform that tightened the government control of the financial system. The power of the central bank was also curtailed by the revision of the Bank of Korea law in 1962, which placed the central bank under the influence of the Minister of Finance as the coordinator of economic policies.

B. Unpleasant Monetarist Arithmetic

From the viewpoint of monetary policy, this period was characterized by "the unpleasant monetarist arithmetic" (Sargent and Wallace 1981), with high inflation following the inevitable monetization of the large fiscal deficit. Figure 2 shows the fiscal deficit and seigniorage in percent of GDP since 1953 when we have the data; the correlation between the two is clear. Over the post-war part of the 1950s (1953-1960), fiscal deficit was 23 percent of GDP and seigniorage 3 percent of GDP on average. Seigniorage thus financed more than 10 percent of fiscal deficit on average, contributing to the average annual inflation rate of 26 percent over the same period (Table 1).

One of the most important macroeconomic challenges of this time was

TABLE 1
DEFICIT, SEIGNIORAGE, AND INFLATION

Year	Fiscal Deficit	Seigniorage	CPI Inflation
1950	n.a.	n.a.	167.5
1951	n.a.	n.a.	-50.9
1952	n.a.	n.a.	1,765.7
1953	17.1	5.6	52.5
1954	36.1	7.5	37.1
1955	24.6	2.9	68.3
1956	n.a.	2.4	23
1957	24	1.3	23.1
1958	28.2	2.7	-3.5
1959	19.4	1.7	3.2
1960	13.1	1.1	8
1961	12.4	1.3	8.2
1962	20.1	0.9	6.6
1963	11.9	0.3	20.7
1964	5.1	0.8	29.5
1965	4.9	0.9	13.5
1966	5.5	1.2	11.3
1967	4.6	1.9	10.9
1968	4.7	1.9	10.8
1969	5.7	1.8	12.4
1970	4.3	1.2	16
1971	4.2	0.8	13.5
1972	6.4	1.4	11.7
1973	2.4	2	3.2
1974	2.2	1.3	24.3
1975	2.8	1	25.2
1976	1.6	1.2	15.3
1977	1.8	1.6	10.1
1978	0.6	1.8	14.5
1979	2.1	1.1	18.3
1980	3.1	0.6	28.7
1981	2.7	0.3	21.4
1982	2.8	1.1	7.2
1983	1.5	0.5	3.4
1984	1.4	0.4	2.3
1985	1.6	0.2	2.5

the stabilization from a very high inflation, a challenge that was experienced by many countries in various points in their economic history. In the late 1950s, the annual financial stabilization program — to be discussed further in the next section — was adopted to control inflation. The program imposed ceilings on the expansion of money supply and credit. This period also included a currency reform in 1962, although

the results were unsatisfactory. By the mid-1960s, the inflation rate came down from the earlier range in middle double digits.

IV. Big Push

A. Chronology (1965-1984)

In 1965, three years after the initiation of the massive mobilization program, the government loosened the control and repression of the financial system. It raised interest rates substantially, for example, one-year term deposit rate rose from 15 to 30 percent overnight. A notable input to this reform was the recommendations of Shaw (1973).

Nevertheless, the need for development financing was the defining factor for financial development during this phase. The government offered implicit or explicit guarantees for foreign borrowing, and interest rates on many policy loans, including exports, were maintained at low levels despite the 1965 liberalization of interest rates. The resulting dual structure in the allocation of loans led to an expansion in the informal credit market (curb market).

Several attempts to develop financial markets garnered limited success, when the priority remained squarely on financing economic development. In the late 1960s, the government established several special-purpose banks, and made attempts to facilitate equity market, with little success. In 1972, the government announced an emergency measure, which included a moratorium on all loans in the curb market. During the rest of the 1970s, the government made several attempts to facilitate the development of the equity market, but again with little success.

Overall, the government was deeply involved in economic mobilization and management. A telling example of the extent of its involvement were two monthly meetings attended by the president and business leaders, intended to discuss economic trends and export performance, respectively. Between 1965 and 1979 (when President Park was assassinated), 298 such meetings were held (Hoshi *et al.* 2009).

B. Dual Financial Markets —Financial Repression and Fiscal Dominance Lite

Despite some loosening in the government control of the financial system in 1965, the financial system remained relatively repressed until a more comprehensive liberalization started in the early 1980s. In the

TABLE 2
MONETARY REGRESSIONS, LIBERALIZATION

	Real Exchange Rate relative to USD	Call Rate	Call Rate	Call Rate	Call Rate
Oil Prices	-12.98 (16.38)				
Relative Productivity	12.02 (2.28)				
Interest Rate	0.00 (0.00)				
Call Rate (-1)		0.77 (0.09)	0.79 (0.08)	0.61 (0.09)	0.71 (0.06)
Inflation Rate		0.70 (0.33)	0.64 (0.32)		
Inflation Rate (4Q ahead)				1.35 (1.24)	1.01 (0.71)
Real GDP Growth Rate		-0.09 (0.10)		-0.64 (0.17)	
Output Gap			0.03 (0.09)		-0.06 (0.07)
Adjusted R-squared	0.65	0.72	0.71	0.45	0.64

Note: Sample period is 1985Q1-1996Q4.

meantime, one conspicuous outcome of government involvement was the large size of directed credit and a consequent expansion in the curb market.

The central bank was a critical part of the directed credit flows. All domestic banks were required to provide policy loans, and the directed credit accounted for more than 50 percent of total bank loans through the 1980s (Kim 2008, Table 10). Additionally, the BOK provided significant support for these policy loans. In the case of export loans, for example, the BOK provided support for about two-thirds of export loans extended by commercial banks over the 1966-1986 period (Box 1 from Cho and Kim 1995).

Thus, seigniorage played a sizable role in the directed credit program, although not in financing government deficit (Giovannini and De Melo 1993). This was not a classic case of fiscal dominance, but probably a softer case of quasi-fiscal dominance, where monetary policy was constrained by the need to finance the state-led drive for economic devel-

TABLE 3
MONETARY REGRESSIONS, OPEN ECONOMY

	Real Exchange Rate relative to USD	Call Rate	Call Rate	Call Rate	Call Rate
Oil Prices	-12.49 (7.80)				
Relative Productivity	14.14 (3.87)				
Interest Rate	-0.04 (0.01)				
Call Rate (-1)		0.73 (0.05)	0.80 (0.05)	0.62 (0.04)	0.79 (0.03)
Inflation Rate		0.27 (0.08)	0.03 (0.09)		
Inflation Rate (4Q ahead)				0.56 (0.14)	0.43 (0.08)
Real GDP Growth Rate		0.05 (0.01)		0.02 (0.01)	
Output Gap			0.09 (0.022)		0.06 (0.01)
Adjusted R-squared	0.77	0.85	0.87	0.71	0.80

Note: Sample period is 1999Q1-2008Q4.

opment. It was financial repression not for government financing, but for state-led development financing.

The dual credit market, a symptom of financial repression, was evident in parallel interest rates that existed in formal and informal credit markets. Policy loans were provided at a much lower interest rate than general loans. The interest rate gap averaged about 10 percentage points during most of this period, until it began to narrow in the early 1980s (Table 3 from Cho and Kim 1995). A natural consequence was the expansion of the curb market, which was estimated to account for about 80 percent of M1 at the time. Moreover, the interest rates in the curb market were estimated to have exceeded the interest rate on general bank loans by more than 20 percentage points during most of this period, until the interest rate gap began to narrow in the 1980s.

The monetary policy of this period is best understood as the combined action of the BOK and the Ministry of Finance. The emphasis was clearly on economic growth, with secondary regard for maintaining low inflation.

A telling description can be found in Cole and Park (1983). Under the financial stabilization program that defined the perimeter of monetary policy, the planners estimated the demand for M1 and M2. Once the decision was made on the "acceptable" level of M2, then the "acceptable" level of domestic credit growth was derived. In the "allocation" of this acceptable level of credit, strategic sectors received preferential treatment.

One clear achievement of this period was economic take-off, with the growth rate in real GDP averaging more than 8 percent per year over the two decades since 1965. Under this environment where economic development was the top priority of macroeconomic policies, we can still attempt to assess the performance of monetary policy in a limited sense. Was the inflation rate of this period higher than was desirable, thereby possibly detracting from growth that could have been even stronger? Otherwise, could the same or similar levels of growth rate have been compatible with a lower rate of inflation?

This question goes beyond the boundary of conventional inflation-output trade-off that is the usual focus of monetary policy analysis — the inflationary consequence of the deviation of output from a trend growth rate. Instead, this question pertains to a less understood relationship between inflation and long-term (trend) growth itself. The literature on growth and inflation suggests that excessive inflation is detrimental to growth — a very high inflation (exceeding 20 percent) has been associated with lower growth rate (Barro 1998). Such excessive inflation was avoided, given that no explosion in inflation occurred. However, inflation rates were on the high side, and exceeded 20 percent in several years in the early 1980s. Inflation rates declined to low single digits only in the mid-1980s, accompanied by a decline in seigniorage (Figure 3). High inflation rates for the most of this period — again, although not explosive — leave open the question of whether a lower inflation could have been compatible with the high growth rate of this period.

We turn to the foreign exchange market for suggestive evidence relating to this question. Starting with the real exchange rates relative to two major trading partners, the United States and Japan, we do not observe an appreciating trend during this period, despite a continued increase in the per capita income relative to the U.S., which would have been closely correlated with labor productivity increases (Figure 4). Turning to the nominal exchange rates, we can see several episodes of nominal devaluation during this period. These movements in the real and nominal exchange rates suggest that inflation was running ahead of productivity

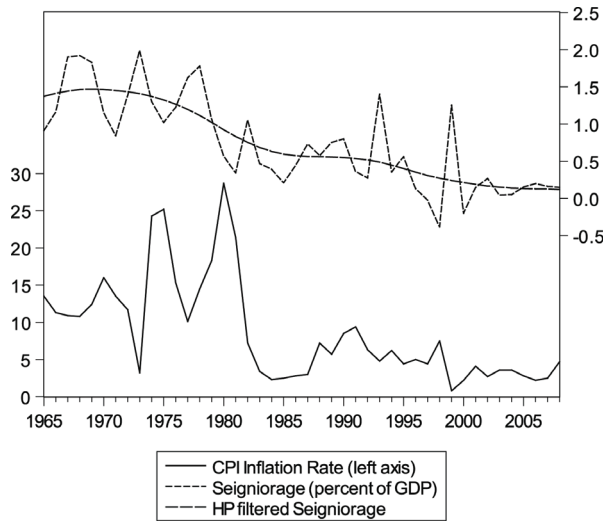


FIGURE 3
SEIGNIORAGE AND INFLATION SINCE 1965

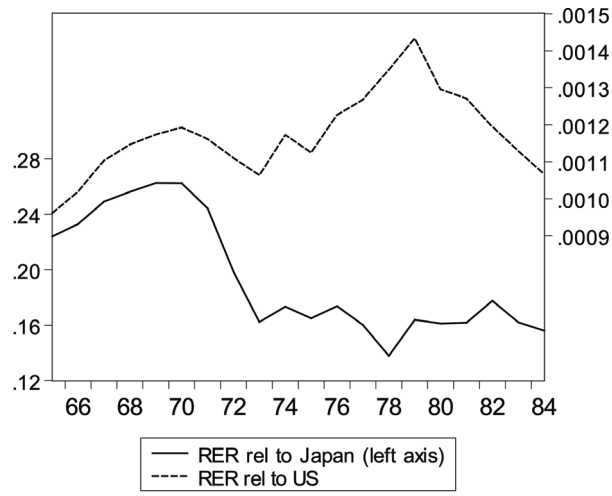
increase, more than what the Balassa-Samuelson effect could account for, thereby leading to devaluations to prevent the real exchange rate from appreciating to a level that undermines the external competitiveness and thus, export-based development strategy.

V. Liberalization

A. Chronology (1985-1998)

The government began to privatize banks gradually in the early 1980s. By 1985, all commercial banks were privatized, although still under the administrative control of the government. In 1989, Korea Foreign Exchange Bank was privatized, as the first case of privatizing a special-purpose bank.

The liberalization of interest rates also started in the early 1980s. Several attempts were made to liberalize interest rates, including by phasing out preferential interest rates on policy loans. Nevertheless, bank interest rates were subject to government control, until a more extensive liberalization was put in place in the 1990s. In 1991, the government established a multi-year plan to liberalize interest rates, which aimed at liberalizing long-term rates ahead of short-term rates, and bank interest



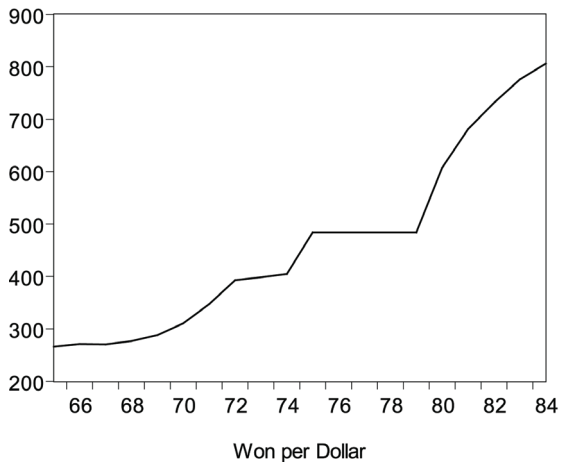


FIGURE 4
EXCHANGE RATES RELATIVE TO THE U.S. AND JAPAN

rates ahead of securities market rates.

The actual interest rate liberalizations in the 1990s, however, deviated from the original plan, and short-term interest rates (including on deposits of non-bank financial institutions) were liberalized ahead of interest rates on time deposits of commercial banks. This fuelled the growth of non-bank financial institutions, and their deposits far exceeded those of commercial banks in the early 1990s (Hoshi, Kim, and Park 2010).

The liberalization of international capital flows also proceeded gradually during this period, picking up speed in the mid-1990s. One important development was the 1994 lifting of the ceiling on short-term foreign currency borrowings by banks, while maintaining the ceiling on longer-term borrowings. Capital inflows picked up significantly in the 1994-1996 period.

The liberalization period concluded with an unintended consequence. The currency crisis that swept through Asia in 1997 hit Korea as well, forcing a sharp economic adjustment. The crisis had the consequence of bringing about shock liberalization, largely completing the macroeconomic liberalization of the Korean economy by 1998. Interest rates were fully liberalized and the exchange rate, which had earlier been allowed to fluctuate within a band, was fully floated at the peak of the crisis in December 1997.

B. Liberalization and Transition

The outcome of gradual liberalization can be seen in two derived statistics: the velocity and money multipliers. In Figure 5, the velocities for M1 and M2 begin to fall distinctively in this period. Money multipliers (M1 and M2 over M0) begin to rise, as illustrated in both Figures 1 and 5. The directed credit program began to decline in size in the early 1990s, and was largely channeled to small and medium-sized firms — as opposed to larger corporations that used to be the main recipients — since the mid-1990s (Kim 2008).

In the middle of ongoing changes in economic environment, the BOK appears to have conducted monetary policy to keep inflation pressure at bay. We base this inference on several regressions that relate to different aspects of monetary policy. The first equation, motivated by the Taylor rule (Taylor 1993; Walsh 1998), regresses a short-term interest rate (call rate) on the CPI inflation rate and GDP growth rate in quarterly frequency. The same regression was also estimated, replacing the GDP growth rate with the output gap, which was calculated as the difference between the actual output and the trend output (Hodrick-Prescott filtered).

$$\text{Irate} = \text{constant} + a^{*}\text{irate}(-1Q) + b^{*}\text{inf} + c^{*}(\text{growth rate or output gap})$$

This equation is intended to summarize the observed outcome of monetary policy, rather than the actual monetary policy rule or conduct.

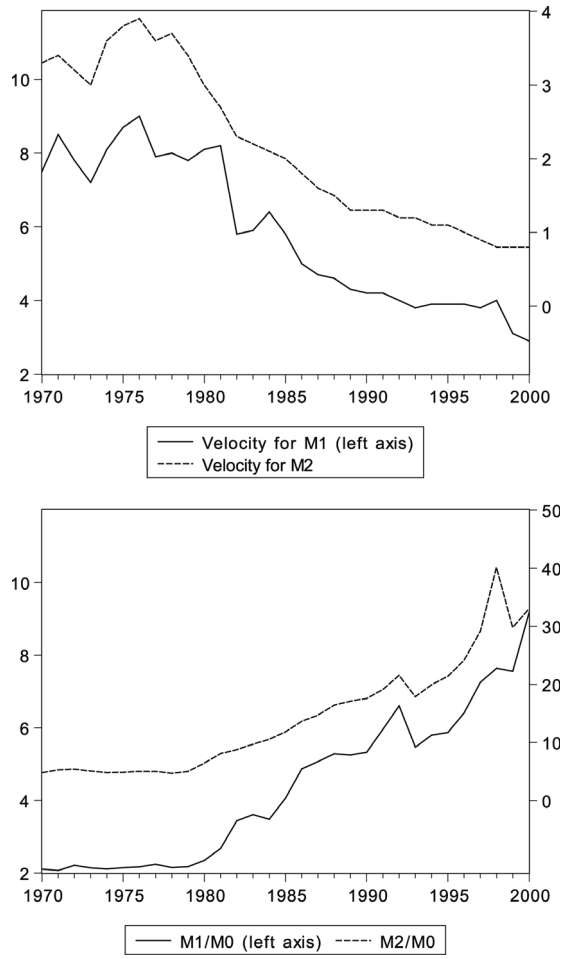


FIGURE 5
VELOCITIES AND MULTIPLIERS

Monetary policy was under a regime of monetary targeting until 1998, and the call rate used in our regression was not a target or instrument of monetary policy during this period. Moreover, we are not using the deviation of inflation from its target value.

The regression (Table 2) nevertheless shows that the short-term interest rate rose more than the inflation rate, implying that the monetary policy affected interest rates in the direction of mitigating inflation pressure. At the same time, the coefficient on output growth is not statistically

significant. One possible explanation is that monetary policy was targeting money supply, in an environment where many interest rates were still being gradually liberalized. As a result, anti-cyclical adjustment in money supply might not have appeared visibly in the short-term interest rate. Another explanation is that monetary policy was providing full ammunition to growth until inflation pressure kicked in, thereby leaving little room for anti-cyclical adjustment in monetary policy stance.

On the external side, the real exchange rate shows positive association with relative productivity growth. We regress the bilateral real exchange rate relative to the United States (the primary trading partner of this period) on the global oil price, productivity differential relative to the U.S., and short-term interest rate differential relative to the U.S. In a fully floating exchange rate regime, higher productivity growth would be associated with real appreciation, higher interest rate with real depreciation (*via* nominal depreciation in quarterly frequency), and high oil price with real depreciation (Korea being an oil-importing country).[3]

$$\text{RER} = \text{constant} + a^{*}\text{oil price} + b^{*}\text{productivity differential} + c^{*}\text{interest rate differential}$$

In the event, we find a statistically significant positive correlation between the real exchange rate and productivity differential. Although this might be viewed as a natural development to be expected of an economy growing at the pace of Korea, such positive correlation did not emerge in the earlier period (Figures 4 and 6). We interpreted the earlier lack of this positive correlation as the outcome of high inflation and occasional devaluations that followed. Furthermore, we interpret the positive correlation of this period as indicating increased macroeconomic stability, consistent with the inflation rate that was much lower than in earlier periods.

In an attempt to bring together the interaction of monetary policy with inflation, growth, and the exchange rate, we estimate a simple VAR model estimated in first-differenced logs. The four variables are the log changes in the real GDP, CPI, nominal exchange rate relative to the

[3] Nominal interest rates are used in this regression because they are closer to the instrument of monetary policy than real interest rates, and because price rigidities keep nominal and real interest rates highly correlated at quarterly frequency. Indeed, we obtain very similar coefficient estimates for interest rates (in both Tables 2 and 3), when we estimate this equation using real interest rates instead of nominal interest rates.

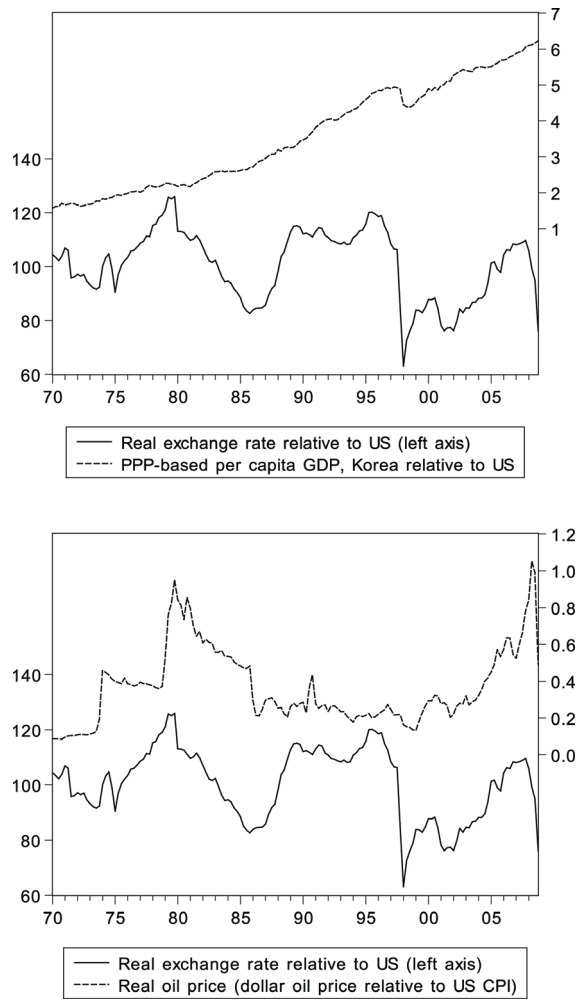


FIGURE 6
REAL EXCHANGE RATE, PRODUCTIVITY, AND OIL PRICE

USD, and short-term interest rate. The interest rate equation is listed last in the system to improve the odds of identifying monetary policy shocks.

Despite carrying little statistical significance, the results are broadly consistent with our discussion so far. Short-term interest rate rises in response to inflation rate with a lag of 4-6 quarters, but responds slightly to growth rates. On the outcome of monetary policy, shocks to short-term interest rate lead to a decline in growth rate with a lag, while hav-

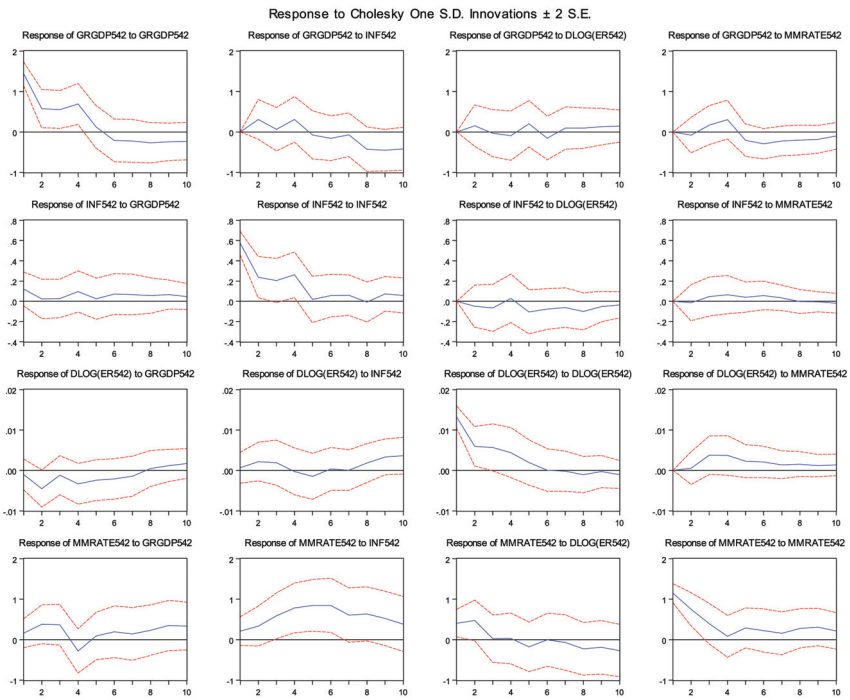


FIGURE 7
VAR IMPULSE-RESPONSES, LIBERALIZATION PHASE

ing minor effects on the inflation rate and nominal exchange rate.

C. Crash —The Asian Crisis

This liberalization phase concluded with a shock liberalization of the economy, following the currency crisis that erupted in 1997. The economy made a quick transition to a small open economy that was fully integrated with the world financial market. The cost and benefit of the consequent acceleration of liberalization may be debated; however, the significant cost that the currency crisis exacted is out of the question. The macroeconomic policy during the crisis was much debated, for example, Coe and Kim (2002).

From the viewpoint of monetary policy, we ask whether there were macroeconomic imbalances that could have been detected and, thus, countered by monetary policy in the lead-up to the 1997 currency crisis. Standard macroeconomic indicators do not appear to have spelled doom

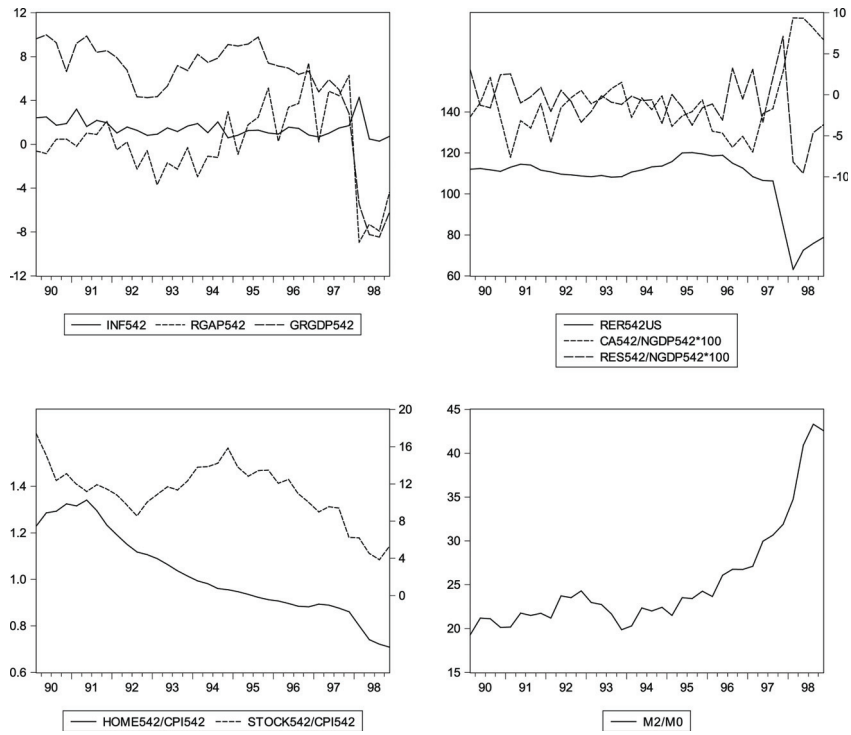


FIGURE 8
THE 1990S UNTIL THE CRISIS

in the years preceding the crisis (Figure 8). Inflation was not alarming, and equity and housing prices were moderating after having peaked early in the 1990s. Output growth was slowing, but not beyond the norm of a cyclical slowdown.

Concern could have been raised about the current account deficit that kept rising, despite the slowing economy and sagging asset prices of the mid-1990s. A relatively weak real exchange rate might have helped moderate the current account deficit. Some econometric support for such an interpretation can be found in Lee (2009a) who applied a simple structural VAR framework to the current account and real exchange rate for several Asian countries. In the mid-1990s, the Korean real exchange rate was influenced by positive transitory shocks that tended to appreciate the real exchange rate and deteriorate the current account balance.

However, it is difficult to imagine that the full intensity of the crisis could have been foreseen on the basis of macroeconomic factors alone.

With the benefit of hindsight, we now understand the role played by the double hazard of maturity and currency mismatches, as well as the large role played by non-bank financial institutions. They have also been found important in many early warning models [see Kim (2006) for various early warning models applied to emerging markets, including Korea]. Although a significant refinement has been made to early warning models after the event, developing a sufficiently persuasive prognosis of crises has proven elusive.

The build-up of vulnerability in the lightly regulated segment of the financial market has common threads with the experience during the 2008 crisis, which we will discuss in Section VII. We close this section with the observation that the virulence of the Asian crisis was not to be expected from the conventional macroeconomic indicators observed before the crisis.

VI. Open Macro-Economy

Following the shock liberalization of 1998 and the adoption of inflation targeting in 1999, the BOK monetary policy has been conducted in the direction of keeping expected inflation around its target, in an economic environment that has become more liberal and open than in any earlier period. The exchange rate regime has become sufficiently flexible, and the financial account regime has also been greatly liberalized.

A. Inflation Targeting

The main features of this period show up from the same econometric specifications that were used in the previous section. The coefficient estimates from the regressions of interest rate and exchange rate confirm that the monetary policy has been conducted under the framework of inflation targeting with flexible exchange rates.

Starting with the regression of interest rate on inflation and growth, this equation now becomes a much better way of capturing the conduct of monetary policy, as the call rate has become the actual policy instrument of the BOK. However, a regression on the current inflation rate is not the best way to capture the conduct of monetary policy under inflation targeting. To manage medium-term inflation and the expectation thereof, inflation-targeting central bank would adjust monetary policy in response to expected inflation. This suggests modifying the Taylor-rule regression by replacing the current inflation with expected inflation

(Clarida *et al.* 2000), although subject to the qualification that econometricians do not get to observe the expected inflation that formed the basis of monetary policy decisions.

We estimate two sets of regressions, using the current and one-year ahead inflation rate on the right-hand side. Under inflation targeting, the coefficient on the expected inflation rate would come out more robust than the coefficient on the contemporaneous inflation rate. The equation with one-year-ahead inflation rate is estimated by GMM, using lagged variables as instruments.

$$\text{Irate} = \text{constant} + a^*\text{irate}(-1Q) + b^*\text{inf} + c^*(\text{growth rate or output gap})$$

$$\text{Irate} = \text{constant} + a^*\text{irate}(-1Q) + b^*\text{inf}(+4Q) + c^*(\text{growth rate or output gap})$$

The estimation results indicate a clear change in the conduct of monetary policy (Table 3). When the contemporaneous inflation rate is used, the coefficient on inflation is numerically smaller than in the previous phase before inflation targeting was adopted, or altogether loses statistical significance in the specification with output gap. The coefficient on inflation is thus less than one in both short term and long term, in clear contrast to the previous phase. When the lead inflation rate is used, the coefficient on inflation is both statistically significant and numerically large. The estimated coefficient implies that the long-run coefficient exceeds one. Moreover, a similar equation estimated for the previous (liberalization) phase produces coefficient estimates on lead inflation that are not statistically significant despite being numerically very large (compare with the last two columns of Table 2). We find this to indicate a clear change in the monetary policy operation to an inflation-targeting regime, where monetary policy stance is adjusted in response to expected inflation.

While our estimation results suggest a change in the conduct of monetary policy between the liberalization phase and the open macroeconomy phase, these results appear to be sensitive to the sample period. Shin (2007) found little evidence in favor of inflation targeting when the sample through 2005 was used, as well as including other variables such as the exchange rate. Our own equation also provides evidence in favor of inflation targeting when it is estimated over a longer sample that goes beyond 2006, and not for a shorter sample. We prefer to use the results based on a longer sample considering that there is a social learning curve when a new policy regime is adopted; however, the

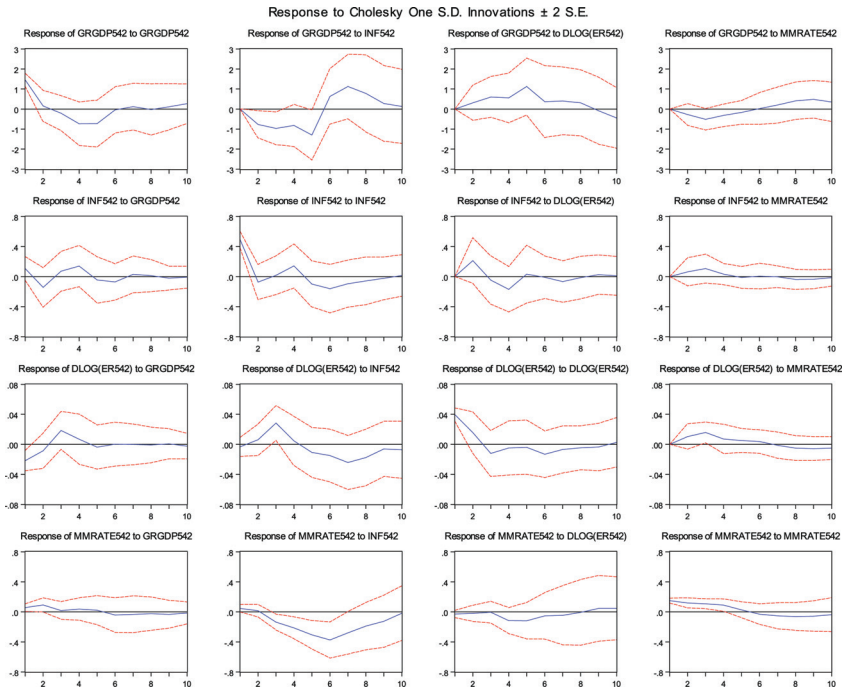


FIGURE 9
VAR IMPULSE RESPONSES, OPEN MACROECONOMY

question awaits further research, including in the direction of Kim and Park (2006). Moreover, our results imply neither that BOK has paid attention only to inflation and growth, nor that inflation targeting is the optimal monetary policy regime for Korea.

The increased flexibility of the economy in both internal and external sides emerges clearly in the real exchange rate regression. In comparison to earlier periods, we see not only the positive correlation between the real exchange rate and relative productivity, but also the negative correlation between the real exchange rate and interest rate differential. This negative coefficient suggests the growing influence of interest rate parity, an outcome of deepening liberalization in international financial flows.[4]

[4] It should be noted that this negative coefficient does not constitute evidence in favor of the interest rate parity. Such a test requires a regression of expected nominal exchange rate change on the nominal interest rate differential. Furthermore, the favorable evidence would require the coefficient on the interest rate

Figure 9 shows the impulse responses from the same VAR as in Figure 7, estimated in log changes of the real GDP, CPI, nominal exchange rate relative to the U.S. dollar, and short-term interest rate. The interest rate equation is listed last in the system to improve the odds of identifying monetary policy shocks.

The results again carry low statistical significance, but indicate a visible change in the response of the short-term interest rate to inflation shocks. The interest rate is found to have decreased in response to shocks to inflation, with a lag of 4-6 quarters. This adds to the evidence for a change in the monetary policy conduct, which we discussed in Table 3. Shocks to short-term interest rates lead to a decline in output growth and a nominal depreciation. The effects are faster or stronger than during the liberalization phase, and the stronger response of the exchange rate to interest rate shocks is consistent with a greater flexibility of the exchange rate in this phase.

A few caveats are in order, however. This simple VAR estimation is a quick first pass at the data (hence, low statistical significance), and is in no way a substitute for a more structured investigation of macroeconomic developments in this period. Indeed, more structured empirical investigations have been provided in many papers, including Kim and Park (2006) and DSGE papers. Our helicopter tour beckons further effort in this direction of applying the tools of macroeconomics to the study of Korean economy and macroeconomic policies.

VII. Great Recession

About a decade since the currency crisis of 1997, the Korean economy was confronted with another large external shock in late 2008. The financial flow reversed, with the large outflow being accompanied by a sharp depreciation in the exchange rate (Figure 10). Industrial production collapsed, stoking fears of another economic crisis. In the event, the situation stabilized and a solid recovery started in 2009. In mid-2010, discussion shifted to the pace of withdrawing policy stimulus. However, the experience since 2008 has revealed a significant challenge for Korea's macroeconomic and monetary policy.

A. Global Crisis and Response in Korea

We want to note first that, beyond the external movements in financial

parity to be close to unity in magnitude.

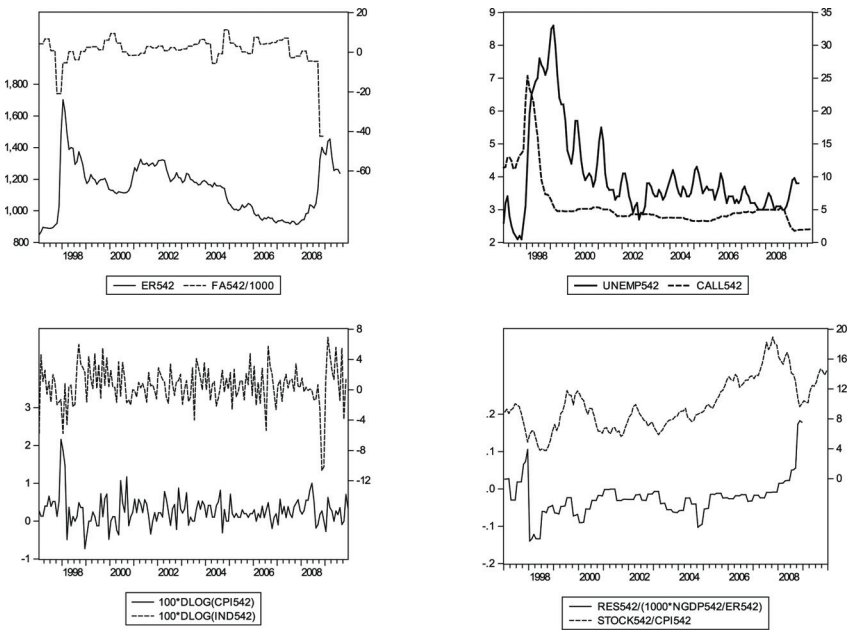


FIGURE 10
THE ASIAN CRISIS AND GREAT RECESSION, 1997-2009

flows and exchange rate, the experience since 2008 was markedly different from that of the 1997-1998 crisis. The difference is clearly evident in several domestic economic indicators illustrated in Figure 10. As the most tangible indicator of the economic consequence of external shock, the unemployment rate increased since 2008 owing to the economic slowdown. However, the magnitude of increase pales next to the doubling of the unemployment rate during the Asian crisis.

This difference is not necessarily because the size of external shock was that much smaller. Since the late 2008, the world economy experienced the most severe economic crisis since the 1930s, being aptly called the Great Recession. The global crisis was triggered by the freeze in the financial system in the fall of 2008, which transformed the financial crisis that had been continuing since 2007 into a global macroeconomic crisis. In 2009, the world output declined by more than half a percent and the world trade volume by 11 percent (WEO 2010).

In the face of the global shock of this proportion, Korea as a trading nation could not escape the adverse consequences. The most visible effects appeared in the financial outflow, exchange rate depreciation, and

the sharp drop in exports and industrial production. However, the effect of the shock was cushioned by macroeconomic policy levers. Fiscal stimulus was provided on the order of 4 percentage points of GDP, together with several emergency measures to provide domestic liquidity.

On the monetary policy end, the policy rate was lowered, in sharp contrast to the Asian crisis when the interest rate was initially raised to a stratospheric level to ward off a collapse in the external balance of payments. Additionally, a high level of reserves made it possible for the central bank to provide liquidity to foreign exchange markets (around 30 billion dollars in 2008). Swap lines with the U.S. FRB, China, and Japan have also helped restore stability to the foreign exchange market.[5]

B. Challenges —Volatility in Financial Flows

Although proactive policy responses helped limit the net economic impact, the 2008 crisis posed several questions. Could the vulnerability of the Korean economy to external shocks have been limited further? Could the effect of external shocks have been mitigated more effectively? Should the stock of international reserves have been larger?

The external borrowing of the banking sector was a critical source of vulnerability. Kim (2009) reported the build-up of currency mismatch in the short-term external asset and liability of the banking sector. The banking sector's net short-term external liability started at a relatively modest 30 billion dollars in 2005, but widened to 120 billion dollars by early 2008. The expansion of the overall balance sheet — despite the same rate of increase on the asset and liability sides — increased the absolute size of mismatch.

Short-term currency mismatch on the external balance sheet results from the maturity and currency transformations of the financial sector. Maturity transformation is a core function of the financial sector, domestically or internationally, and currency transformation is an integral part of financial intermediation in the internationalized financial market. Both of them entail externality, however, and can trigger a run on the financial system. Such a run visited upon Korea in the 2008 crisis, although briefly.

[5] See Blanchard *et al.* (2010) for a discussion of policy responses in emerging markets during the Great Recession, including several case studies. Moreover, de Carvalho Filho (2010) finds that inflation-targeting countries provided greater monetary policy support during the Great Recession.

A few remedies for this vulnerability can be considered.[6]

- A sufficiently high level of reserves can enable the central bank to offset the effect of capital outflow, and ward off confidence crisis. Following the Asian crisis, many emerging market countries accumulated high level of reserves, beyond the levels often seen before the Asian crisis. The motive behind this has been debated, and it may have been the outcome of mixed motives and circumstances rather than being the outcome of a monolithic objective.
  Nevertheless, there is sufficient ground for advocating the insurance benefit of accumulating reserves, in the context of open capital markets (Aizenman and Lee 2007). It is much more contentious to quantify the benefit of accumulating reserves, and the so-called Feldstein-Guidotti rule has been a popular benchmark. The most expansive view has been advanced by Obstfeld *et al.* (2010), who viewed the demand for reserves to originate from the need to ensure financial stability, identifying the M2 as the main determinant of the necessary size of insurance. One implication of this view is that the bullet-proof level of international reserves will be equivalent to the stock of M2, which exceeds 100 percent of GDP in many countries. This is probably a very inefficient way of managing a system of flexible exchange rates, and begs for a more efficient arrangement, be it private or public.[7]
- A sufficiently deep FX market can better absorb the effect of capital flow volatility (Kim and Suh 2010). Moreover, it is eventually a better way to respond to capital flow volatility, for the continued public supply of international liquidity (*e.g.*, by the central bank) will weaken the private sector incentive for managing international liquidity risks. The difficulty lies in its implementation. It is something which a country can try to promote, but not an outcome that a country can produce by fiat. A revealed demand for different currencies can

[6] We discuss policy measures that can be adopted by a country unilaterally, this being a paper on the BOK's policy. We thus shy away from expressing our views on multilateral solutions, which are better discussed in terms of the international financial architecture; only note here that multilateral solutions will have implications on the policy options and tradeoffs of each country.

[7] Inefficiency of reserve accumulation as insurance device has been discussed in Caballero and Panageas (2005), and Lee (2004 and 2009b). See the Mundell Fleming Lecture by Caballero (2010) for an ambitious proposal to improve upon the current state of affairs.

be seen in the COFER database of the IMF — although this refers to public sector demands, there will be some correlation between public and private demands for currencies. Despite significant changes in the global economic landscape over the past several decades, the relative demand for core reserve currencies has been remarkably stable. This indicates that, despite the long-term benefit of deepening foreign exchange market of a currency, the process will be very gradual at best.

- Regulations or controls on financial market play an indispensable role in ensuring financial and macroeconomic stability. Following the crisis, there is probably greater consensus on the need for prudential regulation, in a form that is more comprehensive than was often deemed desirable before the crisis. Most relevant for our discussion is the international aspect of prudential regulation, and whether it will entail measures that can limit the adverse consequence of volatility in international financial flows.

  A strong case for the prudential regulation that covers both domestic and international dimensions can be found in the common characteristics of many financial crises [see Reinhart and Rogoff (2009), for example]. When the prudential regulation is recommended for crisis-prone financial systems, the same principle will call for applying certain regulations to the international financial flows, which tend to trigger crises that share similar characteristics as typical financial crises. Nevertheless, there is a large gray area between prudential regulation and outright capital controls. There is also no consensus on the efficacy of capital controls, as exemplified by the debate on the effects of Chile's capital controls. [See Ostry *et al.* (2010) for extensive discussion of capital controls.]

In practice, policy makers probably have no alternative to adopting a heterodox approach. Many of the considerable measures take a long time, or are the second-best measures that are recommended in the face of financial market frictions, which weigh particularly heavily on the more advanced emerging market economies. Thus, the policy response in this situation may be viewed as a matter of managing the transition toward a more developed financial market, namely, while the act of "emerging" continues. The end goal would be to outgrow the need for many of these intermediate tools, but along the way, the heavy responsibility falls on the shoulders of policy makers.

VIII. Conclusion

The history of Korean monetary policy provides a testimony to the various roles that a central bank can play in an economy with evolving economic conditions. The history offers lessons not only for its macroeconomic role, but also for the politico-economic interactions among different agents in the economy. We emphasize the former aspect by invoking several simple macroeconomic frameworks, with a view toward complementing the analysis of the latter aspect that has been carried out in several existing studies.

The challenge for the future will be to reconcile the proven track record of inflation targeting with the need to cope with continuing changes and evolutions in the financial market, both domestically and internationally. In particular, no universal best practice is available on monetary policy in the face of volatility in asset prices and international capital flows. The story of the first 60 years suggests that this challenge will be met well by the Bank of Korea, which now enters its next 60 years.

(Received 27 September 2010; Revised 10 November 2010; Accepted 11 November 2010)

References

Aizenman, Joshua, and Lee, Jaewoo. "International Reserves: Precautionary vs. Mercantilist Views." *Theory and Evidence, Open Economies Review* 18 (No. 2 2007): 191-214.

Bank of Korea. *Economic Statistics Since Independence.* 2005 (in Korean).

Barro, Robert J. *Determinants of Economic Growth: A Cross-Country Empirical Study*. MIT Press Books, MA: The MIT Press, 1998.

Blanchard, Olivier J., Faruqee, Hamid, and Das, Mitali. The Impact Effect of Crisis on Emerging Market Countries. BPEA, Spring, 2010.

Caballero, Ricardo J. "Sudden Financial Arrest." *IMF Economic Review* 58 (No. 1 2010): 6-36.

Caballero, Ricardo J., and Panageas, Stavros. "Contingent Reserves Management: An Applied Framework, The Central Bank of Chile." *Journal Economia Chilena* 8 (No. 2 2005): 45-56.

Cho, Yoon Je, and Kim, Joon-Kyung. Credit Policies and the Industrialization of Korea, World Bank Discussion Papers, 1995.

Clarida, Richard, Gali, Jordi, and Gertler, Mark. "Monetary Policy and

Macroeconomic Stability: Evidence and Some Theory." *Quarterly Journal of Economics* 115 (No. 1 2000): 147-80.

Coe, David T., and Kim, Se-Jik (eds.). *Korean Crisis and Recovery*. Washington, DC: International Monetary Fund, 2002.

Cole, David C., and Park, Yung Chul. *Financial Development in Korea 1945-1978*. Cambridge, MA: Harvard University Press, 1983.

De Carvalho Filho, Irineu. Inflation Targeting and the Crisis: An Empirical Assessment. IMF Working paper 10/45, 2010.

Dornbusch, Rudiger. *Latin Triangle*. MIT mimeo, 1996.

Fischer, Stanley. "Globalization and Its Challenges." *American Economic Review* 93 (No. 2 2003): 1-30.

Gerschenkron, Alexander. *Economic Backwardness in Historical Perspectives*. Cambridge: Harvard University Press, 1962.

Giovannini, Alberto, and De Melo, Martha. "Government Revenue from Financial Repression." *American Economic Review* 83 (No. 4 1993): 953-63.

Hoshi, Takeo, Kim, J., and Park, YC. Growth and Structural Changes in Korea's Financial Sector, 1985-2008. Harvard/KDI Book Manuscript, 2010.

Kim, Kyungsoo. Panel Approach to Efficient Early Warning System. Sungkyunkwan University, Mimeo, 2006 (in Korean).

Kim, Kyungsoo. Korea's Financial Market and Policies. Mimeo, 2008 (in Korean).

Kim, Kyungsoo. Macroeconomic Vulnerability of Small Open Economy. The Federation of Korean Industries, Seoul, 2009 (in Korean).

Kim, Kyungsoo, and Suh, Young Kyung. Dealing with the Benefits and Costs of Internationalization of Korean Won. Mimeo, 2010.

Kim, Soyoung, and Park, Yung Chul. Inflation Targeting in Korea: a Model of Success? In Monetary Policy in Asia: Approaches and Implementation, Proceedings of a BIS/HKIMR Conference Held in Hong Kong SAR on 21-22 November 2005, BIS Papers 31, 2006.

Lee, Jaewoo. Insurance Value of International Reserves: An Option Pricing Approach. IMF Working Paper 04/175, 2004.

Lee, Jaewoo. "External Balances in Five Asian Countries." In Yin-Wong Cheung and Kar-Yie Wong (eds.), *China and Asia: Economic and Financial Interactions*. London and New York: Routledge, pp. 99-112, 2009a.

Lee, Jaewoo. "Option Pricing Approach to International Reserves." *Review of International Economics* 17 (No. 4 2009b): 844-60.

Obstfeld, Maurice, Taylor, Allan, and Schambaugh, Jay. "Financial

Stability, the Trilemma, and Internatioanl Reserves." *American Economic Journal: Macroeconomics* 2 (No. 2 2010): 57-94.

Ostry, Jonathan D., Ghosh, Atish R., Harbermeier, Karl, Chamon, Marcos, Qureshi, Mahvash S., and Reinhardt, Dennis B. S. Capital Inflows: The Role of Controls. IMF Staff Position Note SPN/10/04, February 19, 2010.

Reinhart, Carmen, and Rogoff, Kenneth. *This Time is Different: Eight Centuries of Financial Folly*. NJ: Princeton University Press, 2009.

Sargent, Thomas J., and Wallace, Neil. "Some Unpleasant Monetarist Arithmetic." *Federal Reserve Bank of Minneapolis Quarterly Review* 9 (No. 1 1981): 15-31.

Shaw, Edward. *Financial Deepening in Economic Development*. New York: Oxford University Press, 1973.

Shin, Kwhanho. "Assessment of Monetary and Exchange Rate Policy after the Crisis." *The Korean Economic Review* 55 (No. 4 2007): 275-312 (in Korean).

Taylor, John. "Discretion versus Policy Rule in Pratice." *Carnegie-Rochester Conferences Series on Public Policy* 39 (No. 1 1993): 195-214.

Walsh, Carl E. *Monetary Theory and Policy.* MA: MIT Press, 1998.

Woo, Jung-en. *Race to the Swift: State and Finance in Korean Industrialization*. New York: Columbia University Press, 1991.

World Economic Outlook. Washington: International Monetary Fund, 2010.